# Heterogeneous catalysis applied to the synthesis of glycerol derivatives

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Although glycerol has been a well-known renewable chemical for centuries, its commercial relevance has increased considerably in the last few years. Glycerol can be used as commodity for the synthesis of a large number of interesting raw chemicals[1], but volatile market of glycerol is limiting some of those applications. Producing cheap and easily available products from glycerol, as a renewable raw material, using heterogeneous catalysis in order to design greener processes is the main purpose of this work.

Particularly, acetals and ketals derived from glycerol such as solketal or glycerol acetates are interesting products no only for their utilization as solvents but also as fuel additives. We present here the use of heterogeneous catalysts, such K10 or sulfonated hydrotermal carbons, for the synthesis of several glycerol ketals and mono, di and triacetylglycerol, as a green alternative to the use of homogeneous acid catalysts.

In the case of ketals, traditionally when using $H_2SO_4$ as catalyst good yields are achieved but elimination of the catalyst from the reaction media involve treatment with basic aqueous solutions leading to a great loss of the desired ketal. Substitution of homogeneous acid catalyst by K10 allowed not only the obtaining of high reaction yields but also an easy purification of the ketal by simply filtration of the catalyst. The catalyst was reuse without any loss of activity.

In the case of the synthesis of glycerol acetates, previous works demonstrated the difficulty of the obtaining of high yields of triacetin. The use of sulfonated hydrotermal carbons as heterogeneous catalysts allowed the obtaining of mixtures of glycerol acetates with high contents of triacetines and minimum amounts of monoacetin.

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Reference:

1. Behr, A., Eilting, J., Irawadi, K., Leischinski, J., Lindner, F., *Green Chem*. **2008**, 10, 13-30.

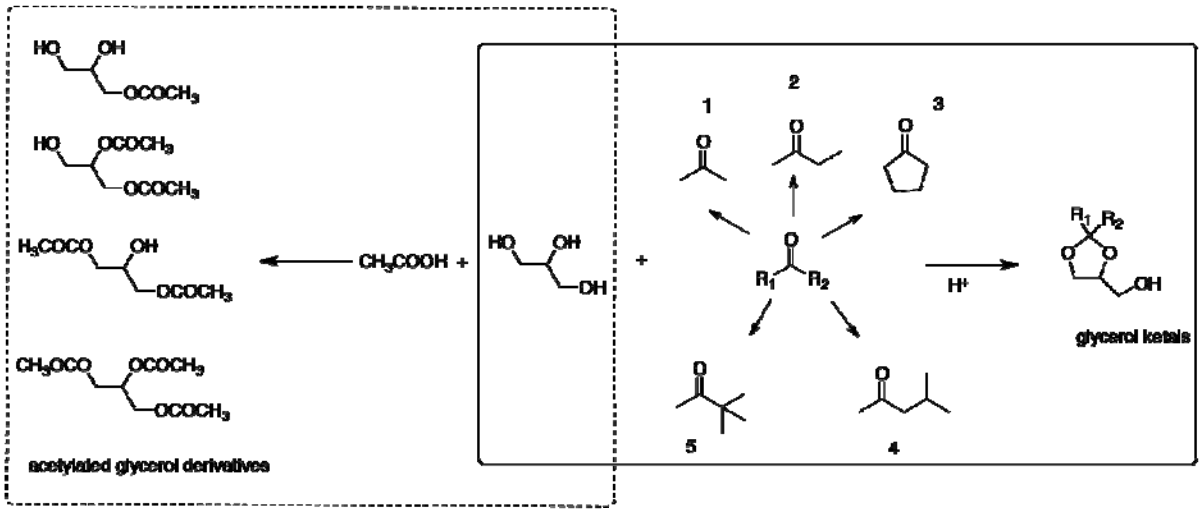


Fig. 1 – Synthesis of glycerol derivatives